IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Machael, Jay R. et al.	)	Attorney Docket No. 087522785336
Application No.: 10/750,576	)	
Filed: December 30, 2003	)	
For: CHAIR BACK REST WITH IMPROVED RESILIENCE AND SUPPORT	)	
Examiner: White, Rodney Barnett	)	
Art Unit: 3636	)	
Confirmation No.: 8920	)	

AMENDMENTS TO THE SPECIFICATION

Please amend paragraph 0001 to read as follows:

[0001] This patent application is related to the patent applications "Chair with Backward and Forward Passive Tilt Capabilities," Application No. 10/749,008 ~~attorney docket number 087522-785-323~~; "Horizontally Adjustable Chair Arm Rest," Application No. 10/748,537 ~~attorney docket number 087522-785-329~~; "Vertically Adjustable Chair Arm Rest," Application No. 10/749,010 ~~attorney docket number 087522-785-347~~; "Chair with Adjustable Seat Depth," Application No. 10/748,079 ~~attorney docket number 087522-785-349~~; and "Chair with Tilt Lock Mechanism," Application No. 10/749,009 ~~attorney docket number 087522-785-350~~; each application being filed on even date herewith and incorporated herein by reference in its entirety.

Please amend paragraph 0002 to read as follows:

[0002] This invention relates to a chair having a seat ~~portion~~ and a back ~~backrest portion~~, wherein the back ~~backrest~~ includes a cushion ~~means~~ for providing improved resilience and support. In particular, the invention relates to a chair for office use wherein the back ~~backrest~~

includes a cushion ~~means~~ for providing improved resilience and support, which cushion ~~means~~ automatically self-adjusts as the back ~~backrest portion~~ reclines.

Please amend paragraph 0003 to read as follows:

[0003] It is known in the art of office seating design to provide an office chair with a back ~~backrest portion~~ that adjustably reclines in response to pressure exerted by the user's back, and then returns to its original position as the user's back moves forward. Such chairs are typically designed to provide a support for the user's lumbar region when the back ~~backrest portion~~ is in the fully upright position. The lumber support can be either fixed or manually adjustable. One difficulty with such prior art chairs is that a fixed lumbar support, or even one that is manually adjustable, may not meet and comfortably support the lumbar regions of users of different heights. Another difficulty with such prior art chairs is that as the user reclines ~~back~~, the position of the user's lumbar region shifts with respect to the position of the fixed lumbar support in the backrest portion. Thus as the backrest portion reclines, the user's lumbar region may not receive optimum support over the range of motion of the backrest.

Please amend paragraph 0004 to read as follows:

[0004] It is thus one object of the invention to provide a chair back ~~backrest portion for a chair~~ that includes a cushion ~~means~~ for automatically providing resilience and support for a user's back.

Please amend paragraph 0005 to read as follows:

[0005] It is another object of the invention to provide a chair back ~~backrest portion for a chair~~ that includes a cushion ~~means~~ for providing lumbar support that automatically self-adjusts to comfortably support users of different heights.

Please amend paragraph 0006 to read as follows:

[0006] It is still another object of the invention to provide a chair back ~~backrest portion for a chair~~ that includes a cushion ~~means~~ for providing adjustable resilience and support that automatically self-adjusts to comfortably support users as the user changes positions against the back ~~backrest~~, and as the back ~~backrest portion~~ reclines over different angles of inclination in response to pressure exerted by the user's back.

Please amend paragraph 0007 to read as follows:

These and other objects of the invention are met by a chair having a seat ~~portion~~ and a back ~~backrest portion~~, the back ~~backrest portion~~ being capable of reclining in response to pressure exerted thereon by a user's back, the chair back ~~backrest portion~~ including in its interior a cushion ~~means~~ for providing automatically self-adjusting resilience and support, the cushion being ~~said means comprising a~~ fluid-containing ~~cushion~~. The cushion is substantially coextensive with at least that region of the surface of the chair back ~~backrest portion~~ that engages the user's lumbar region. The cushion provides automatically varying pressure in response to the variable pressure exerted by different regions of the user's lumbar region, or other regions of the user's back that overlay the cushion. The cushion automatically accommodates users of different heights, and automatically self-adjusts to variations in applied pressures as the back ~~backrest portion~~ reclines through a range of angles.

Please amend paragraph 0008 to read as follows:

[0008] In a preferred embodiment, the cushion comprises two sheets of flexible, air-impermeable plastic film, sealed together so as to define a volume having a lower region and an upper region. The cushion preferably has seams that define a plurality of channels extending generally from the lower region to the upper region when the cushion is installed in a chair back ~~backrest portion of a chair. Each channel is partially filled with fluid~~. As the user leans his or

her back against the chair back ~~rest~~, greater pressure will be exerted against the cushion by the user's upper back and shoulders than by the user's lumbar region. This will force ~~more~~ fluid from the upper region of the cushion downward toward the lower region, to provide increased resilient lumbar support for the user. The precise location of the increased lumbar support can vary along the length of the channels, so as to provide improved lumbar support as an individual user shifts position in the chair, and for users of different heights. Moreover, as the individual user reclines the backrest, the location of the increased lumbar support can shift in response to variable pressures exerted by different regions of the user's back, so that the improved chair back ~~backrest~~ automatically provides optimum resilient back support to the user at any angle of inclination.

Please amend paragraph 0010 to read as follows:

[0010] FIG. 1 is a diagrammatic, sectional elevation ~~side cross-sectional~~ view of a chair having a back ~~backrest~~ of the invention;

Please amend paragraph 0011 to read as follows:

[0011] FIG. 2 is a front elevation ~~cutaway~~ view, partially cutaway, of an embodiment of a chair back ~~backrest of the invention therein~~;

Please amend paragraph 0012 to read as follows:

[0012] FIG. 3 is a sectional plan ~~an end on~~ view of the cushion of FIG. 2; and

Please amend paragraph 0013 to read as follows:

[0013] FIG. 4 is a front elevation ~~elevational~~ view of a another embodiment of a cushion ~~for use in the instant invention~~.

Please amend paragraph 0014 to read as follows:

[0014] As illustrated in FIG. 1, a chair 10 includes a seat 11 and a back ~~backrest~~ 12 having a forward facing side 14 and a rearward facing side 16. The back ~~backrest~~ 12 comprises a substantially rigid support member 18, covered at least on its forward facing side ~~14~~ with an upholstery-type covering 20 such as fabric, vinyl or leather. Optionally a pad 22 of foam or other resilient material such as is known in the art, is disposed on the forward facing surface of the ~~substantially rigid~~ support member 18.

Please amend paragraph 0015 to read as follows:

[0015] ~~In accordance with the invention, a means for providing resilience and support for a user's back comprises a~~ A fluid-containing cushion 30, FIGS. 1-3, is located ~~disposed~~ between ~~substantially rigid~~ the support member 18 and the upholstery cover 20. An optional pad 32 ~~23~~ of foam or other resilient material can be disposed between the cushion 30 and the upholstery cover 20. The cushion ~~Cushion~~ 30 comprises a first layer 34 ~~32~~ and a second layer 36 ~~34~~, each of the layers being made of an air-impermeable plastic, the layers being hermetically sealed together about their respective peripheries to form a peripheral seal 38 ~~36~~. The cushion includes a top portion 40, a bottom portion 42, a left side portion 44 and a right side portion 46. The cushion 30 preferably is sized and dimensioned to be substantially co-extensive with at least that region of the chair back ~~backrest~~ 12 that will experience pressure exerted by the back of a user of the chair 10, extending from the upper back and shoulders down to and including the lumbar region. For ease of reference, the structure of the invention will be discussed in terms of a lower region 50 ~~40~~ and an upper region 52 ~~42~~, although it will be appreciated that the actual proportions of the inventive cushion that will serve as lumbar support region and upper back support region, respectively, will depend upon the size and height of the individual user.

Please amend paragraph 0016 to read as follows:

[0016] In a preferred embodiment, the two layers 34, 36 ~~32 and 34~~ of the cushion 30 are further joined by a plurality of seams 54 ~~37~~. The seams 54 ~~37~~ together with the peripheral seal 38 ~~36~~ define a plurality of channels 56 ~~38,~~ that generally extend from the lower region 50 ~~40~~ to the upper region 52 ~~42~~. The channels can be substantially vertical, as illustrated in the figures, or they can be oriented at different angles.

Please amend paragraph 0017 to read as follows:

[0017] Each channel 56 ~~38~~ contains a fluid 58. ~~In the illustrated embodiments of the invention, the~~ The channels are in fluid communication with one another through a plurality of openings 60 ~~39~~ in each of the seams 54 ~~37~~. The sizes and locations of the openings 60 ~~39~~ can be varied to achieve a desired response. Alternatively, openings 60 ~~39~~ can be omitted, and each channel 56 ~~38~~ will be completely sealed unto itself.

Please amend paragraph 0019 to read as follows:

[0019] In use, when a user of the chair leans against the chair back ~~backrest~~ 12, the user's back will be in contact with forward surface 14 and exert pressure thereon. The user's upper back and shoulders will cause some compression of partially filled channels ~~38~~ primarily in upper region 52 ~~42~~, causing fluid to be driven into lower lumbar region 50 ~~40~~ where it will provide additional support to the user's lumbar region, where such support often is most needed. It may be seen that the exact location of the additional lumbar support along the length of channels ~~38~~ will be determined automatically by the physical dimensions of each individual user. It is not necessary for an individual user to make manual adjustments to the chair in order to obtain optimum support in the lumbar region. Thus, the fluid support system of the instant invention provides an automatic passive adjustable support of the lumbar region, responsive to

each individual user. The inventive system advantageously applies equalized pressure along the user's back.

Please amend paragraph 0020 to read as follows:

[0020] Moreover, when a user reclines the chair back ~~backrest 12 of chair 10~~, the individual's spinal curvature will change, with the manner and amount of change depending on the individual's physical dimensions and the angle of inclination of the chair back ~~backrest~~. The lumbar region ~~19~~ of the ~~rigid~~ support member 18 is curved to conform generally to the lumbar region of a user. Generally, the radius of curvature of a user's back will be smaller than the radius of curvature of a lumbar region ~~19~~ of the ~~rigid~~ support member 18. The space between the user's lumbar region and the lumbar region ~~19~~ of the ~~rigid~~ support member 18 defines a relatively small volume to be filled with fluid. As the chair ~~seat~~ back reclines, the user's spinal curvature changes, and in particular the arch of the user's lumbar region and upper back. The areas of pressure exerted by the user's back when reclined will vary along the length of the channels ~~38~~. Fluid within the ~~partially filled~~ channels will shift away from the areas where pressure is greatest, such as upper region 52 ~~42~~ contacted by the user's upper back and shoulders, and towards the region ~~areas~~ where pressure is least, such as lower region 50 ~~40~~ at the user's lumbar area. Typically, it is the lumbar region where support is needed most. The shifting of fluid within the channels ~~38~~ will happen automatically as the user alternately reclines and straightens the chair back ~~rest~~. At the same time, there will be less fluid volume in the cushion in upper ~~back~~ region 52 ~~42~~, such that there will be greater stability of the user's upper back, with no unwanted side-to-side rolling motion. Thus the fluid-containing cushion of the instant invention automatically adjusts to the needs of different individual users, and to the different needs of a single individual as that user assumes different angles of inclination and different positions

during the course of ordinary use of the chair. Advantageously, the user will not feel any discontinuity in pressure or support in the lumbar region, regardless of the angle of inclination; i.e., there is no "edge" where lumbar support ends, as can be experienced with systems that employ a discrete mechanical lumbar support member.

Please amend paragraph 0021 to read as follows:

[0021] It will be appreciated that the channels ~~38~~ preferably are not filled to their highest capacity. If the pressure in the channels ~~38~~ were too high, then the cushion 30 would not yield in response to unevenly applied pressures; i.e., the fluid would not be able to shift from a region of higher applied pressure such as the ~~shoulder and~~ upper ~~back~~ region 52 ~~42~~ to a region of lower applied pressure such as the lower or lumbar region 50 ~~40~~.

Please amend paragraph 0022 to read as follows:

[0022] The cushion of the instant invention can be manufactured of fluid-impermeable plastic films that can be sealed together to form hermetic seals. Such plastic films can include, for example, vinyls, polyurethanes, polyvinyl chlorides, ethylene vinyl acetates, urethane coated membranes, polyolefins, sarans, and engineered multi-layer films. The plastic film selected for the cushion will be practically air-impermeable, having an air transmissibility rate as measured by ASTM D1434 (Standard Test Method for Determining Gas Permeability Characteristics of Plastic Film and Sheeting) of less than about 100 $cm^3/m^2/day/atm$; preferably less than about 10 $cm^3/m^2/day/atm$; and most preferably less than about 5 $cm^3/m^2/day/atm$. The thickness of the plastic film can be in the range of about 2-20 mil, more preferably about 4-10 mil, and optimally about 4 mil. One particularly preferred material for an air-containing cushion is 4.0 mil Saranex 15, a multi-layer film available from Dow Medical Films and comprising a "Saran®" barrier resin co-extruded between outer layers of polyolefins. The films can be sealed together to form

the peripheral ~~periphery~~ seal 38 ~~36~~ and seams 54 ~~37~~ by known sealing means, such as adhesives, heat sealing, ultrasonic sealing, and RF sealing. Those skilled in the art will be able to select a sealing means suitable for the particular film material being used. A desired amount of air is injected into the various chambers of the cushion during the sealing process by methods known in the art of the manufacture of air-filled bladders.

Please amend paragraph 0023 to read as follows:

[0023] The dimensions of the cushion, and the size, number, and angular orientation of the channels ~~38~~ of the cushion, can be varied to accommodate (1) the needs of different users; (2) the design of the chair as a whole, including whether any optional pads of foam or other resilient material are used in front of and/or behind the cushion, and the characteristics of the optional pads; and (3) the different applications for which the chair will be used. The size and number of the openings 60 ~~39~~ also can be varied to achieve a desired fluidic response. Further, additional padding such as a foam layer or a gel layer can be interposed between the cushion 30 and the upholstery cover or layer 20.

Please amend paragraph 0024 to read as follows:

FIG. 4 illustrates a preferred embodiment of a chair back ~~rest~~ cushion 100 ~~generally indicated at reference numeral 130~~. The cushion 100 ~~Cushion 130~~ comprises two sheets of plastic film (like that shown in FIG. 3) sealed together with a peripheral seal 102 along a top portion 104, bottom portion 106, left side portion 108 and right side portion 110 ~~136~~. The top portion 104 of the cushion 100 includes two parallel, horizontal seals 112, 114, and the bottom portion 106 of the cushion also includes two parallel, horizontal seals 116, 118. Between the two upper seals 112, 114 are circular seals 120, 122, 124, 126, 128. Between the two bottom seals 116, 118 are three circular seals 130, 132, 134. Extending the full vertical length of the cushion

~~130~~ are two seams~~, 134, 135,~~ that divide the interior of cushion 100 ~~130~~ into a central or center chamber 140 ~~139~~ and left and right ~~two~~ side chambers 142, 144 ~~138~~. The central and side chambers are filled with air. ~~In this embodiment, each of central chamber 139 and side chamber 138 is partially inflated with air.~~ Partial or short middle seams 146, 148 ~~137~~ in each of the side chambers 142, 144 ~~chamber 138~~ extend vertically from about the upper seals 112, 114 ~~top of each side chamber 138~~ down to about the vertical midpoint of the chambers ~~thereof~~. These partial middle seams 146, 148 ~~137~~ prevent the side chambers 142, 144 ~~138~~ from bulging too much at the upper end, and maintain a more uniform pressure level throughout the length of the cushion. The middle seams 146, 148 divide each respective left side and right side chambers into two chambers 142a, 142b and 144a and 144b. It will be understood that middle ~~partial~~ seams 146, 148 ~~137~~ could be in the forms of spot welds, i.e., discrete spots where the two layers of cushion 100 ~~130~~ are bonded together. Such spots could be arranged in lines or over an area, as long as they serve to moderate expansion of the side chambers 142, 144 ~~138~~. In the illustrated embodiment, the middle seams 146, 148 ~~partial seam 137~~ terminates in enlarged ~~a~~ tear-drop shaped configurations 150, 152 ~~element~~, which relieves localized stresses in the plastic sheets.

Please amend paragraph 0025 to read as follows:

[0025] The ~~In the illustrated embodiment, the~~ cushion 100 ~~130~~ is about 18 inches high and about 14 inches wide along its top portion 104 ~~horizontal edge 150~~. The sides taper inward slightly beginning about six inches from the bottom portion 106 ~~edge~~, such that the width of the bottom portion 106 ~~edge 152~~ is about 10 inches. The center ~~Center~~ chamber 140 ~~139~~ is pressurized with about 100 cubic centimeters of air, and the side chambers 142, 144 ~~138~~ are each pressurized with about 300 cubic centimeters of air. Alternatively, an external pump can be provided so that the user can adjust the amount of air in the cushion in accordance with

individual preferences. The center chamber 140 is of a generally constant width in a vertical direction and each of the chambers 140, 142, 144 is sealed from one another by the vertical seams 136, 138.

Please amend paragraph 0026 to read as follows:

[0026] The present invention provides a significant improvement over prior art chair back ~~rest~~ supports. Unlike foam pads, which simply compress in response to applied pressure, the fluidic support of the present invention redistributes pressure, such that as one part of the cushion compresses, another part expands, to provide additional support where it is needed most.